Sivyer Steel Corp

Iowa Manufacturing Extension Partnership

Sivyer Steel Studies Sand Reclamation Technology

Client Profile:
Sivyer Steel Corporation, located in Bettendorf, Iowa, manufactures plain carbon steel, low alloy steel, austenitic manganese steel, stainless steel, and high chrome iron sand castings. The company services the recycling, construction equipment, mining, power generation, pump and valve, defense contracting, and transportation industries. Established in 1895 as Zimmerman Steel Casting Company, the firm originally produced stump-pulling machinery and, during World War I, manufactured anchor chains for the Navy and cast armor for the Army. In 1961, the Sivyer Steel Casting Company of Milwaukee purchased the facility, and has modernized and expanded the foundry. The company's 200 employees continue to produce and sell castings ranging from 5 pounds to 20,000 pounds to industries worldwide, resulting in over $30,000,000 in annual sales.

Situation:
Sivyer Steel's chromite and silica sand usage has more than doubled to 4500 tons per year in response to market demands for highly engineered cast components. Chromite sand is used in the Apha-Set no-bake molding of steel castings to promote directional solidification and prevent sand defects in areas of high heat concentration. While Sivyer reclaims approximately 50 percent of its silica sand, continued increases in chromite sand usage seriously threaten the effectiveness of this operation. When chromite sand mixes with the silica sand during processing, it contaminates the reclamation efforts.
Sivyer Steel was considering a chromite sand separation system that would allow it to both purify and reclaim the chromite-contaminated silica sand, and also reuse the separated chromite sand. In the past, the Iowa Manufacturing Extension Partnership (IMEP), a NIST MEP network affiliate, has worked with the company to investigate opportunities for the beneficial reuse of foundry sand. Because of this valued relationship, Sivyer Steel contacted IMEP for help finding resources to determine the feasibility of pursuing this technology.

Solution:
IMEP, together with Sivyer Steel, jointly developed an action plan that outlined strategies, participants, time lines, and costs, aimed at successfully achieving the desired outcome. Then IMEP worked to identify, contact, secure resources, and coordinate meetings between company and technical resources. IMEP also helped Sivyer Steel secure external funding to help finance this

project.
Once resources had been selected and terms of the research had been agreed upon, IMEP managed the project according to Sivyer Steel's schedule and project expectations. Working with its selected resources, Sivyer Steel assessed the factors critical to the successful implementation of a Furan no-bake molding and core making system compatible with its current operations. Next, the company evaluated the performance of participating Furan suppliers, narrowed the list to two sources, and conducted shop trials with these final two suppliers. Based on their performance in the shop trials, Sivyer Steel selected a preferred Furan supplier to participate in a test project with a potential chromite sand reclamation equipment manufacturer.
Next, IMEP helped Sivyer Steel identify and select a chromite sand reclamation equipment manufacturer--GUT, in Freudenberg, Germany--to test the Furan sand. The company conducted initial testing with GUT and its Furan sand supplier. Based on the tests, Sivyer Steel concluded that implementation of a chromite sand separation system would purify the chromite-contaminated silica sand to 99 percent purity, a ratio that will allow silica sand reclamation. Up to 80 percent of the separated chromite sand could also be reclaimed for reuse, thus averting stockpiling and land filling of the mixed sand waste stream and greatly lessening the amount of virgin sand introduced into the casting/molding process. However, implementation of this technology can only be successful if Sivyer Steel changes the type of chemical system used in its casting/molding process from Alpha-Set to Furan. The company is now preparing to make the changes and begin its reclamation initiatives.

Results:
Estimating a diversion of 8,544 tons of silica sand and 2,880 tons of chromite sand from the landfill to be reused annually (savings of $376,992).
Exploring new opportunities for alternative reuses of foundry sand.
Anticipating waste stream reductions of $7,904, corresponding cost savings of $160,624, and reduced raw material costs of $1,003,686.
Enhancing competitiveness of the company by reducing costs and improving steel casting quality.
Increasing throughput in molding areas utilizing chromite sand by reducing the need to handle intensive new sand.

Testimonial:
"Without the assistance of the Iowa Manufacturing Extension Partnership we would not have been able to develop a strategic action plan aimed at identifying and assessing the factors critical to successful integration of the new chemical binder system into our current operations according to schedule. Iowa MEP utilized their extensive network of consultants and resources to develop a step-by-step action plan resulting in a comprehensive and thorough feasibility study. Moreover, the Iowa MEP assistance went beyond the development of the strategic and feasibility aspects of the project. Their

assistance was invaluable in identifying and securing funding to implement the project's recommendations."

Philip D. Bruno, Vice President - Technology